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EARLY HOME-GROWN SEED FOR PLANTING THE LATE POTATO CROP IN MARYLAND*

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Two crops of potatoes are grown during the season in most parts of Maryland where the elevation is less than 1,000 feet above sea level. The early crop is usually planted between the middle of March and early April and the late crop between the middle of July and early August. Planting dates vary with location, varieties and season. Irish Cobbler was formerly the most extensively grown variety for the early crop but recently has been replaced to a large extent by Katahdin. On the Maryland Eastern Shore home-grown seed is used for planting the largest portion of the crop but in other parts of the state northern-grown seed is used more extensively. With the exception of Dakota Red, which is rapidly being replaced by other varieties, northern-grown seed is used almost exclusively for planting the late crop. In order to prevent excessive shrinking and sprouting which results in poor stands and low yields, seed for the late crop must be kept

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in cold storage from early April until planting time. In many parts of Maryland, especially on the southern Eastern Shore, the early crop matures early enough to provide seed for the late crop but such seed is not used extensively because it is usually too slow in coming up to produce marketable tubers before the vines are killed by frost.

Ever since the senior writer began experimenting with potatoes in 1924, it has been realized that potato growers could save themselves much trouble and expense if a way could be found to hasten the sprouting of early crop tubers sufficiently to produce good stands and high yields when used to plant the late crop. Denny's (1, 2)[4] success in hastening sprouting with ethylene chlorhydrin and sodium, potassium and ammonium thiocyanate encouraged the senior writer and his associates to experiment with the use of early-grown seed, treated to hasten sprouting, for planting the late crop. This work was begun in 1932 and has been continued to the present time. The tubers from the early crop were usually harvested about the middle of July and planted back within several days. The tubers were usually cut one or two days prior to planting and the cut seed pieces treated either the day they were planted or the day preceding planting. Results of studies made from 1932 to 1940 inclusive have been published (5).

Studies were made from 1941 through 1943 with stored Irish Cobbler[1] and Dakota Red[1] and early-grown treated seed of Irish Cobbler,[2] Warba[2] and seedling 47148, later named Marygold[2] (4). The results of these studies in stand and yield are given in table 1. Prior to 1942, the best results from treatment had been obtained with the Warba variety. However, with all early or medium-early varieties tested prior to 1942 when either treated early-grown seed or seed from the previous season kept in cold storage were used to plant the late crop, only a few tubers were produced which were large enough to make good table stock.

In 1942 and 1943 Marygold was included in the tests. The yield from early-grown, treated Marygold seed did not differ significantly from the yield from stored Irish Cobbler seed from the previous season and was significantly larger than the yield from stored Dakota Red seed from the previous season in 1942 but smaller in 1943. The treated early crop Marygold seed also produced large enough tubers to make it suitable for table stock.

In 1944, thiourea was included in the tests and several of the chemicals used to hasten sprouting were combined in equal proportions. Treated seed pieces were also dusted with thiram (Arasan) and tetrachloro-para

[1] Basement storage during winter, cold storage during summer.
[2] Cut early-grown seed soaked 1 hour in a 1 per cent solution of sodium thiocyanate (1 pound in 12 gallons of water) and planted immediately.

TABLE 1.—*Late crop stand and yield from stored Dakota Red and Irish Cobbler seed and from treated, early-grown seed of three varieties at Pocomoke, Maryland.*

	Yield U. S. No. 1* in Bushels per Acre			Per cent Stand		
	1941	1942	1943	1941	1942	1943
Dakota Red stored at approximately 40° F.	34	119	157	83	65	76
Irish Cobbler stored at approximately 40° F.	42	162	35	90	65	70
Irish Cobbler treated**	20	91	17	60	73	42
Marygold treated**		160	54		64	40
Warba treated**	45	123	16	93	80	52
Difference required for significance at 5 per cent level	16.2	36.5	19.3			

* U. S. No. 1 equivalent, not officially graded.
**Cut early-grown seed soaked one hour in a 1 per cent solution of sodium thiocyanate (1 pound in 12 gallons water) and planted immediately.

benzoquinone (Spergon) with the hope of preventing rotting of seed pieces in the soil. Marygold and Irish Cobbler were the only varieties included and Marygold was again found to respond much better to the treatment than Irish Cobbler. Combining different chemicals failed to increase stands and yields, as you will note in table 2. There was no significant difference in stands and yields among treatments with sodium thiocyanate, ethylene chlorhydrin and thiourea. Dusting the treated seed pieces with either Spergon or thiram had no significant effect upon either stands or yields.

In 1945, the authors began searching for more satisfactory material for hastening the sprouting of early-grown seed potatoes and for preventing the rotting of seed pieces in the soil. Reports of successful results with ammonium thiocyanate solutions (6) prompted the authors to include it in their tests.[1] In addition to the ammonium thiocyanate and the chemicals used in previous tests nabam (Dithane D-14) was included with the hope of reducing decay of seed pieces. The largest yield was obtained from stored Marygold seed from the previous season, but did not differ significantly from yields from two plots from early-grown seed, one from seed treated with ammonium thiocyanate and the other from seed treated with sodium thiocyanate, both followed by dipping the treated seed pieces in thiram. Both of these plots yielded significantly more than the plot grown from early Marygold seed soaked in water. Twenty-three other chemical treat-

[1] Material supplied by Research Division of the Koppers Co.

TABLE 2.—*Average yield from five randomized replications, each 1/697 acre in 1944 with early-grown seed planted on July 19 and harvested October 30 and 31 at Pocomoke, Maryland.*

Variety	Treatment[1]	Yield[2] Bushels per Acre U. S. No. 1[3]	Total	Per Cent Stand
Marygold	Eth. chl. — thiram	191	216	96
Marygold	Eth. chl.	179	203	84
Marygold	Sod. thio.	170	200	91
Marygold	Sod. thio. — thiram	165	189	83
Marygold	Eth. chl. — Spergon	153	179	86
Marygold	None	114	134	70
Marygold	Sod. thio. — Spergon	106	130	83
Marygold	Spergon	84	111	59
Marygold	Thiram	67	90	33
Irish Cobbler	Thiourea	67	111	90
Irish Cobbler	Sod. thio.	67	100	80
Irish Cobbler[4]	Eth. chl. — thiram	67	100	70

[1] Unless otherwise stated seed pieces were soaked 1 hour in a 1 per cent solution of either ethylene chlorhydrin, sodium thiocyanate or thiurea and planted immediately. Spergon and thiram (Arasan) were applied as dusts after treatment.

[2] A difference of 73 bushels between yields of U. S. No. 1 equivalents is significant at the 5 per cent point.

[3] U. S. No. 1 equivalents, not officially graded.

[4] Total yields from 9 other similar treatments with early-grown Irish Cobbler seed varied from 41 to 62 bus. of U. S. No. 1 potatoes with stands varying from 29 to 91 per cent.

ments on freshly harvested Marygold potatoes failed to increase yield significantly above that of the water check, but plants in the water check plot came up later and the average size of the tubers was smaller. Nine of the treatments applied to early grown Marygold seed produced a yield which did not differ significantly from that of Irish Cobbler seed from the previous season. Yields from treated early-grown Irish Cobbler were all very low and none was significantly better than the water check. Spergon was injurious and reduced stands and yields. When it was used as a dip after treatment of the seed pieces with ethylene chlorhydrin no plants emerged.

Stands and yields were so poor in 1946 that no reliable yield records could be obtained. In 1947 zineb (Dithane Z-78) was added to the tests and seedling B61-3, later named Cherokee, was included. The largest yields were obtained from the stored Marygold seed from the previous season and

early-grown Marygold seed treated for 1 hour with a 1 per cent solution of ethylene chlorhydrin; 170 bushels of U. S. No. 1 equivalent potatoes per acre. Stored Irish Cobbler with 194 bushels and stored Dakota Red with 150 bushels did not differ significantly in yield.

Nine other treatments of early-grown Marygold seed fell in the same group with stored Irish Cobbler and Dakota Red with respect to yield. In all except five of the plots in which early-grown Marygold seed was treated with chemicals to hasten sprouting the yield was significantly larger than the yield from early-grown Marygold seed treated with water or not treated at all. With Irish Cobbler there was no significant difference in yield between the dry and water checks and the treated early-grown seed. However, in most of the plots grown from early-grown seed which was not treated or which was treated only with water or thiram, nabam, or zineb the plants were slower in coming up and the average size of the tubers was smaller.

In 1948 a heavy rain fell soon after the late potato test plot was planted and the portion of the field in which the early-grown seed was planted was drowned out and no yield records could be obtained.

Again in 1949 early-grown Marygold seed responded to the treatment to hasten sprouting better than any other variety or seedling. From the appearance of the vines it seemed that some of the seedlings might respond as well but when they were harvested the average size of the tubers in the Marygold plots was always larger. Although none of the plots from early-grown seed treated to hasten sprouting yielded significantly more than the plots from untreated seed or seed treated with water, plants in the check plots were always slower in coming up, the average size of tubers was smaller, and they did not mature as early. With few exceptions plots grown from seed treated with ammonium thiocyanate alone or in combination with protectants were better in appearance and yield than plots grown from seed treated with sodium thiocyanate alone or with ethylene chlorhydrin alone or in combination with protectants. (Table 3) The combination of protectants with the chemicals used to hasten sprouting did not significantly increase either the yield or the stand. There was no significant difference in either yield or stand between plots grown from seed treated the same day they were planted or the day preceding planting. The weather was very hot and dry when the late potato plot was planted on the Eastern Shore and only fair stands and yields were obtained. Eleven of the plots from early-grown seed yielded significantly more than the Marygold plot grown from 1948 seed kept in cold storage.

Summary

1. Tubers from early-grown seed of certain potato varieties can be used

TABLE 3.—*Average yield from five randomized replications each 1/679 acre in 1949 with early-grown seed and seed of the previous season planted July 21 and harvested October 25 at Pocomoke, Maryland.*

Variety	Treatment	Bushels per Acre U. S. No. 1[3]	Total	Per Cent Stand
Marygold	Amm. thio. and zineb treated day before planting	176	186	60
Marygold	Amm. thio.	175	191	64
Marygold	Amm. thio. & nabam	168	179	56
Marygold	Amm. thio. & zineb	164	170	64
Marygold	Amm. thio. treated day before planting	161	173	60
Marygold	Amm. thio. & thiram	145	162	64
Marygold	Sod. thio. & zineb	145	159	62
Marygold[4]	None	138	157	52
Marygold	Amm. thio. & thiram treated day before planting	136	147	56
Marygold	Sod. thio.	130	143	56
Marygold	Sod. thio. & nabam	119	127	48
Marygold	Eth. chl. & zineb	99	103	48
Marygold	Sod. thio. & thiram	96	102	44
Seeding B 434-122	Amm. thio. & thiram	87	99	72
Marygold	Eth. chl.	87	98	44
Irish Cobbler[5]	Amm. thio. & thiram	77	96	56

[1] Nabam (Dithane D 14) used at rate of 4 quarts per 100 gallon of solution and thiram (Thiosam) and zineb (Dithane Z 78) used at rate of 1 lb. per 4 gal. of solution. A ¾ per cent solution of ammonium thiocyanate, sodium thiocyanate and ethylene chlorhydrin was used. Seed pieces were soaked 10 minutes.

[2] A difference of 52 bushels between yields of U. S. No. 1 equivalent is significant at the 5 per cent point.

[3] U. S. No. 1 equivalent, not officially graded.

[4] Plants came up later and the average size of tubers was smaller.

[5] Yields from 16 additional treatments varied from 12 to 75 bushels per acre with stands varying from 52 to 90 per cent. These included 3 treatments with Marygold, 2 with Pawnee, 2 with Essex, 1 with Irish Cobbler, and 6 treatments with various seedlings. It also included yields from Marygold and Dakota Red seed from the previous season stored at approximately 40° F. during the summer.

successfully to plant the late potato crop on the Maryland Eastern Shore.

2. Certain chemical treatments of cut seed pieces to hasten sprouting sometimes increase stands and yields, and have resulted in causing the plants to come up more evenly and produce tubers of larger average size and earlier maturity.
3. The most successful results have been obtained with the Marygold variety. Warba also gave good results. Results with Irish Cobbler were always very poor.
4. Best results were obtained when the seed pieces were planted in cool moist soil. Planting in hot dry soil should be avoided, even if planting must be delayed.
5. Even though ammonium thiocyanate, sodium thiocyanate, ethylene chlorhydrin and thiourea hastened sprouting, the ammonium thiocyanate seemed to be somewhat preferable to the others. Neither stands nor yields were improved by combining sodium thiocyanate with ethylene chlorhydrin or with thiourea.
6. Results from ¾ per cent solutions were just as good as from 1 per cent solutions and soaking the cut seed pieces for 5 minutes in the solution gave just as good results as soaking them ten minutes or an hour.
7. No difference in stands and yields resulted when the seed pieces were treated the day they were planted or the day before planting except where ethylene chlorhydrin was combined with nabam, in which case the treatment the day prior to planting caused injury.
8. Nabam, thiram, zineb or Spergon either as dusts or liquids following treatment to hasten sprouting did not increase yield or stand. Combining nabam, zineb or thiram with ammonium thiocyanate or ethylene chlorhydrin did not modify the affect of the sprout-hastening chemicals but did not increase yields or stands. Spergon following treatment to hasten sprouting reduced yields and stands.

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POTATO VINE KILLING METHODS AS RELATED TO RATE OF KILL, VASCULAR DISCOLORATION, AND VIRUS DISEASE SPREAD

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Introduction

Potato vine-killing has of necessity become a commercial practice in Maine and many other potato-producing areas during the past several years. It is practiced mainly for four reasons: to reduce the spread of virus diseases in seed potato fields, to control late blight tuber rot, to allow harvesting the crop before freezing weather, and to control tuber size (1, 2, 3, 4, 12, 14, 15)[3].

The practice of killing potato vines to reduce the spread of virus diseases was adopted by Maine seed producers in the late 1930's, and the value of early harvest was recognized even prior to that time (13). Better insect and disease control through the use of DDT and improved fungicides in addition to better methods of applying these materials in recent years have resulted in the vines usually remaining green until killed by frost. In Maine, to avoid the possibility of losses caused by low temperatures, it is essential that potatoes be harvested in a comparatively short period of time during September and early October. This means that during years when a killing frost does not occur until late in the season growers either have to employ some method of killing the vines prior to harvest or harvest potatoes while the vines are still green. If late blight is present, considerable losses frequently occur from late blight tuber rot if potatoes are harvested from green vines (1, 2, 3, 4). Excessive skinning and bruising of tubers also result during harvesting operations if vines are not killed two weeks or more prior to harvest.

One of the first methods of destroying potato vines practiced by Maine growers was that of hand-pulling. This method proved to be impractical on large commercial acreages because of the excessive cost and the need for large numbers of laborers to accomplish the job. Therefore, considerable interest has been shown in the use of relatively new methods of potato vine-killing, and research has been conducted for several years to compare these methods.

Steinbauer (15) in 1946 reported the appearance of occasional

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[3] Numbers in parenthesis refer to "Literature Cited."

discoloration in the vascular bundles of tubers harvested from vines killed with sodium nitrate, dinitrocresol and phenol compounds. Prince (11) in 1947 made detailed microscopic examinations of discolored tubers harvested from vines killed with chemicals. He concluded that the discoloration was confined to the xylem elements of the vascular ring with the discoloration being more dense on the stem end side of the vessel end walls.

Other investigators using chemical vine-killers (3, 4, 9, 10, 12) have reported the occurrence of vascular discoloration in tubers following the use of these materials. However, few have attempted to differentiate between the vascular discoloration produced by vine-killing and that produced by other causes. The vascular discoloration induced by vine-killing is distinctly different from that of stem-end browning and net necrosis described by Folsom and Rich (8). They described stem-end browning as affecting both the phloem and xylem, whereas net necrosis affects only the phloem. The "half-inch depth" method of cutting described by Folsom and Rich has been used with success to differentiate between the vascular discoloration produced by vine-killing (Fig. 1, A and B) and the discoloration which is typical of stem-end browning (Fig. 1, C and D). Generally, stem-end browning is confined to the stem-end portion of the tuber and usually does not occur at depths greater than one-half inch from the point of stolon attachment. Vascular discoloration produced by vine-killing in most cases will extend more than one-half inch from the point of stolon attachment. The vascular discoloration resulting from vine-killing may also be readily distinguished from net necrosis (Fig. 1, E). Discoloration from vine-killing is confined to a definite ring within the vascular tissue, whereas that of net necrosis is usually scattered throughout the vascular tissue, giving the characteristic netted appearance typical of the disease. However, the presence of net necrosis in tubers would result in a "masking" of the discoloration produced by vine-killing. Green Mountains and Irish Cobblers appear to be readily susceptible to stem-end browning and net necrosis, whereas varieties such as Katahdin and Chippewa have only rarely been found with either of the diseases (8). Vascular discoloration resulting from vine-killing has been reported in practically all varieties that have been used in vine-killing tests.

Callbeck (3, 4), while reporting his work from Prince Edward Island with the Green Mountain variety, uses the terms stem-end browning, stem-end discoloration, and vascular discoloration more or less interchangeably. This raises the question of whether he studied the effect of vine-killers on stem-end browning or did not differentiate between the two types of discoloration. It is noted that in his latest report (4) the percentage of tubers showing discoloration increased considerably for all

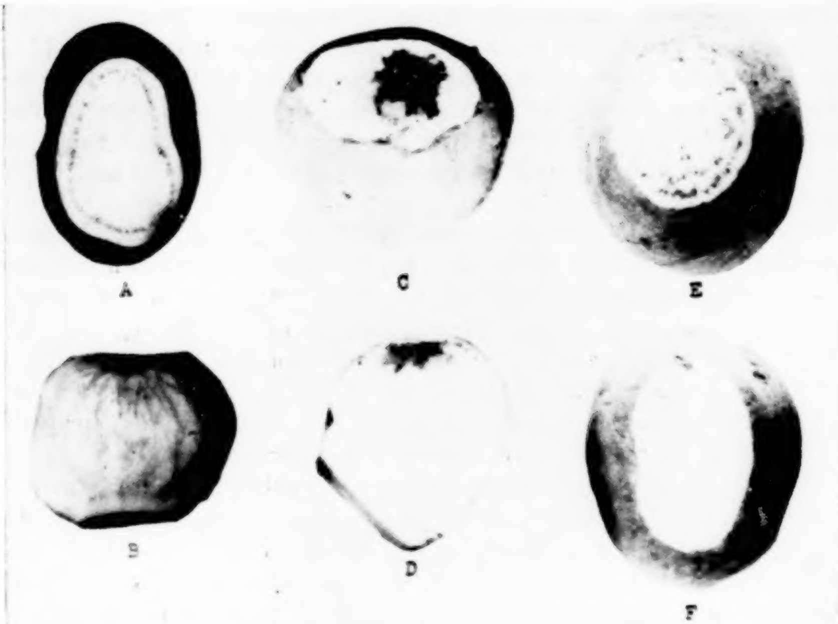

Figure 1. A and B: Tubers showing vascular discoloration produced by chemical vine killing
C and D: Stem-end browning
E: Net necrosis
F: Normal tuber
(Photos C, D, E & F by courtesy of D. F. Folsom and M. T. Hilborn)

treatments after being in storage six weeks as compared to fourteen days after application of materials. This indicates that a portion of the discoloration was stem-end browning, since Folsom and associates found that a storage period of 90 to 100 days at 50°F. resulted in maximum development of stem-end browning (5, 6, 7, 15). In the work in Maine no increase in vascular discoloration has been found to occur in storage.

The differences between results reported by Prince, *et al.* (11) from the Maine Station and those reported in this paper may be explained by differences in interpretation of what constitutes vascular discoloration produced by vine-killing. It is believed that they classified the normal yellowing of the vascular ring at the stem end of tubers at time of harvest as a discoloration. This was not classified as discoloration in the present work.

Experimental Procedure

1948. Several different materials and methods of vine killing were compared regarding rate of kill and the amount of vascular discoloration

produced in the tubers in 1948. The materials, methods, and concentrations used on plots planted May 18 are listed in table 1. Chemical sprays at the rate of 140 gallons per acre were applied with a hand boom and a small experimental sprayer. The pressure at the fan type nozzle was 50 pounds per square inch. Cyanamid dust was applied with a Root hand-duster. Four-row plots 25 feet long, with three or four replications for each treatment, were used for each variety. Irish Cobblers were killed August 26 and harvested September 3. The remaining varieties were killed September 8, harvested and placed in storage September 29, with the exception of one series of the Katahdin variety which was killed August 15 to simulate early harvest conditions.

TABLE 1.—*Materials and methods used to kill potato vines in 1948*

Commercial Name	Active Ingredient	Concentration per 100 Gallons of Spray Applied 140 Gallons per Acre
Vines Pulled	——	——
Rotobeater	——	——
Flame Burner	——	——
Dust:		
Cyanamid Aero Defoliant	Calcium cyanamid	200 lbs.
Sprays:		
Vine Kil	Sodium arsenite	2 gals.
Dow 66 Improved	Dinitro-ortho-secondary butyl phenol	2 gals. plus 2 lbs. aluminum sulfate
Sinox General	Dinitro-ortho-secondary amyl phenol	3 pts. plus 4 gals. of fuel oil
American Tar Acid	Cresylic acid	6 gals.

Observations on the rate of kill of leaves and stems were made following the application of the materials until the vines were dead. Tuber samples from each plot were cut in the field to determine the amount of vascular discoloration. Duplicate samples from all plots were placed in storage at temperatures of 37° and 50°F. These samples were examined for vascular discoloration in November and February.

The vascular discoloration index was determined by cutting and examining 75-tuber samples. These were placed into 3 classes as follows: Class 1 — no discoloration; Class 2 — moderate; and Class 3 — severe. The number of tubers in classes 1, 2, and 3 were multiplied by values of 0, 1, and 2, respectively. Thus, a sample consisting of tubers having no discoloration (Class 1) would have an index value of 0, and a sample consisting of tubers showing severe discoloration (Class 3) would have an index value of 150.

1949. In 1949 Irish Cobblers were planted May 10 and again on May

24. At 6-day intervals starting August 11 plots of each planting were sprayed with Sinox General at a concentration of 3 pints plus 4 gallons of fuel oil per 100 gallons of water at the rate of 140 gallons per acre. Observations of discoloration produced in the tubers were made within 1-2 weeks after each application of material. Later examinations were made November 29, 9 weeks after harvest.

Plots of Katahdin potatoes were sprayed with Sinox General, rotobeated, and the remaining vine stubs sprayed with Sinox General on August 18. Samples of tubers from these treatments were planted in 1950 and examined for the presence of leafroll disease.

Effect on Rate of Kill

All varieties were killed more readily as they increased in maturity. The later-maturing varieties, Katahdin, Green Mountain and Sebago, were more difficult to kill than were the earlier-maturing varieties, Cobbler and Chippewa. Vines of Katahdin potatoes treated August 15 formed new growth following all materials and methods with the exception of hand-pulling. A subsequent application of chemical sprays, at the concentrations indicated in table 1, failed to inhibit all new growth at that early date of treatment.

Of the chemical materials tested September 8, the American Tar Acids, Dow 66 Improved, and Sinox General gave the most rapid rate of kill, a complete kill of leaves resulting 2 to 3 days after application. Vine Kil gave a somewhat slower rate of kill, followed by Cyanamid Aero Defoliant, which gave a relatively slow rate of kill. Cyanamid did not give a satisfactory kill on the later-maturing varieties. The effectiveness of cyanamid apparently is more dependent on weather conditions than either the tar acids, dinitros, or arsenicals. Application when the vines are damp is considered necessary for an effective kill with cyanamid, which is in agreement with the observations of Hoyman (9, 10).

The flame burner destroyed leaves immediately but left stems standing which usually produced new growth if vines were relatively immature when treated. The rotobeater macerated the foliage entirely, with the exception of 4 to 5 inches of the stems, which usually produced new growth in the case of the later-maturing varieties. The dinitro compounds were very effective in inhibiting this new growth at the concentrations indicated in table 1.

Amount of Vascular Discoloration

The amount of vascular discoloration produced in the tubers of five varieties as a result of the different materials and methods of vine-killing is shown in table 2. In general, the greatest amount of discoloration was produced in tubers of the early-maturing varieties, Irish Cobbler and Chippewa.

If only the chemical and flame burner methods are considered, those methods or materials that killed the foliage most rapidly tended to produce the greatest amount of discoloration in the tubers. However, rotobeating and hand pulling resulted in very little vascular discoloration. A small amount of discoloration even occurred in tubers of the Irish Cobbler variety harvested from vines that matured naturally. Discoloration was present in tubers harvested from vines of the Chippewa and Sebago varieties that were killed by frost. This might lead one to conclude that factors other than rapidity of kill influence the amount of discoloration resulting from vine killing.

It is apparent from the results in table 3 that the age at which vines are killed may influence the amount of discoloration produced in the tubers. In Irish Cobblers planted May 10 and killed at 93, 99, and 105 days from planting, there was a decrease in the amount of discoloration for the later dates of kill. However, for the May 24 planting, killing vines at 85 and 91 days from planting resulted in an increase in discoloration compared with those killed at 79 days from planting, although there was a sharp decline in the amount of discoloration resulting from killing vines 98 days after planting. Apparently the discoloration produced from vine-killing increased with the age of the plants until the vines were maturing very rapidly from natural causes, then discoloration as a result of vine-killing decreased. This is in partial agreement with Callbeck (4), who reported that the amount of discoloration in tubers increased uniformly with the age of plants when killed with dinitro ortho secondary butyl phenol.

Change in Discoloration During Storage

The amount of vascular discoloration in tubers harvested in 1948 from the treatments and varieties indicated in table 2 was essentially the same for storage temperatures of 37° and 50°F. at the November and February examinations. The data indicate that very little, if any, fading or increase in discoloration occurred between November and February at either 37° or 50°F.

No appreciable fading or increase in vascular discoloration was found in tubers of Irish Cobblers killed in 1949 with Sinox General when examined at intervals of one and two weeks after application of the material. Later examinations that were made nine weeks after harvesting, indicated that very little if any fading or discoloration occurred in the storage period immediately following harvest in this year.

Effect of Method of Vine Killing on Spread of Leafroll Disease

The data in table 4 indicate that the method of killing vines influenced the spread of leafroll disease. Evidently no infection of the tubers with

TABLE 2.—*Percentage of tubers showing vascular discoloration and the discoloration index — 1948*

Material or Method	Irish Cobbler		Chippewa		Katahdin		Green Mountain		Sebago	
	Per cent	Index	Per cent	Index	Per cent	Index	Per cent	Index	Per cent	Index
Vines Pulled	0	0	0	0	0	0	0	0	6	5
Rotobeater	0	0	0	0	5	3	1	1	11	8
Flame Burner	—	—	83	69	93	88	87	78	21	16
Dust:										
Cyanamid Aero Defoliant	0	0	1	1	4	3	0	0	5	4
Sprays:										
Vine Kil	8	6	20	15	49	38	9	7	31	27
Dow 66 Improved	88	88	79	64	39	35	51	42	35	27
Sinox General	91	86	67	54	17	13	33	28	31	26
American Tar Acid	41	32	31	24	—	—	15	16	36	31
Vines undisturbed[1]	2	2	15	12	0	0	0	0	4	3

[1] Plants of the Irish Cobbler variety were dead by September 16, but other varieties were killed by frost on that date.

TABLE 3.—*Effect of maturity of Irish Cobbler potatoes on vascular discoloration index[1] — 1949*

Date of Kill	May 10 Planting		May 24 Planting	
	Index	Days from Planting	Index	Days from Planting
Aug. 11	67	93	55	79
Aug. 17	64	99	62	85
Aug. 23	37	105	60	91
Aug. 30	—	—	14[2]	98

[1] Discoloration index values are averages for three dates of examination for the Aug. 11, 17 and 23 killing dates, but for only 2 dates for Aug. 30. Vines were killed with Sinox General at 3 pints and 4 gallons fuel oil in 140 gallons of spray per acre.

[2] Vines were nearly dead.

TABLE 4.—*Effect of method of vine-killing on spread of leafroll disease[1]*

Method of Killing in 1949[2]	Percentage of Leafroll in 1950
1. Rotobeated, followed by Sinox General — 3 pints and 4 gallons fuel oil per 100 gallons of spray	0
2. Rotobeated only[3]	0.4
3. Sinox General — 3 pints plus 4 gallons fuel oil per 100 gallons	1.5
4. Vines undisturbed — late harvest	2.5

[1] The presence of leafroll was not detected immediately before vines were killed. The disease readings were made by Donald Merriam.

[2] Vines were rotobeated and chemical spray applied August 18. The chemical spray following the rotobeater was applied August 23.

[3] New growth formed.

the leafroll virus had been accomplished by aphids at the August 18 date of treatment. The absence of leafroll following rotobeating and spraying possibly may be explained on the basis that the vines were destroyed before the virus was translocated to the tubers. With spraying alone the virus apparently was translocated to the tubers while the foliage was dying. The presence of leafroll following rotobeating alone may be the result of infection with the leafroll virus of the new growth formed after rotobeating.

SUMMARY

The effect of various vine-killing methods on five varieties of potatoes was studied over the 1948-1950 period.

All varieties were killed more easily as they matured. Later-maturing varieties were more difficult to kill than the earlier-maturing.

Of the chemicals used, the dinitros and tar acids gave the most rapid rate of kill, the arsenicals an intermediate rate, and cyanamid a relatively slow rate of kill.

The greatest amount of discoloration occurred in the early-maturing varieties. With the exception of the rotobeater and hand-pulling, those materials or methods that killed the vines most rapidly tended to produce the greatest amount of vascular discoloration. The amount of vascular discoloration produced by vine-killing tended to increase with age of the plants until the plants were maturing rapidly, at which time there was a decline in the amount of discoloration. No appreciable fading or increase in vascular discoloration was detected in tubers during storage of 5 varieties at 37° and 50°F. when examined in November and February. The amount of discoloration did not appear to increase or fade in Irish Cobbler tubers when examined at intervals of one and two weeks after application of the material.

Rotobeating potato vines followed by a chemical spray reduced the spread of the leafroll virus, as compared with rotobeating alone or chemical vine-killing alone.

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CULL-POTATO PILES AS BREEDING PLACES FOR THE POTATO PSYLLID AND TUBER FLEA BEETLE

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(Accepted for publication August 13, 1951)

The improper disposal of cull potatoes in the potato-growing areas in Colorado, Wyoming, and Nebraska is a serious menace to potato crops. A large tonnage of cull potatoes from farm storages and commercial warehouses are dumped each year near storage cellars, on waste land, and at public dump grounds. Potatoes that are dumped in the spring, after freezing weather is over, sprout and produce a dense growth of foliage on which insects, primarily the potato psyllid *(Paratrioza cockerelli* (Sulc.)*)* and the tuber flea beetle *(Epitrix tuberis* Gent.*)*, breed during the spring and early part of the summer, and later move to cultivated crops. Little attention has been given by growers and warehousemen to the elimination of this source of infestation on cultivated crops.

In view of the importance of the cull-potato problem, experiments were conducted by the author to determine the extent of breeding of psyllids and tuber flea beetles on potato sprouts developing in cull piles and to devise efficient methods of eliminating this hazard.

Previous Work. — Little previous study appears to have been done on the influence of cull-potato piles in breeding spring populations of potato insects or of methods for controlling them. The writer (Wallis, 1946) has shown that very large populations of psyllids occur on cull piles, in comparison with those on cultivated crops, and that they are forced to move, principally to the early potato crop, when the potatoes in cull piles die in July. Hill and Tate (1944) have shown that very large populations of overwintered flea beetles — as high as 738 beetles per 100 sweeps of an insect net — occur during May and June on potatoes in cull piles, and that large numbers of beetles of the new brood emerge in July from cull potatoes that were exposed to overwintered beetles in June. They report that 722 flea beetles emerged from a section of cull piles 20 inches square and 7 inches deep.

Occurrence of Cull-Potato Piles. — Cull potatoes consist of tubers that are unsuitable for the market because they are diseased, injured, too large, or too small. They are discarded in the commercial warehouses and farm storages when the crop is being prepared for market. Some of these tubers are suitable for livestock feed, but their use is very limited.

Tubers discarded during the winter will freeze and, therefore, will not

sprout. Those dumped in the spring, even though light freezes occur, will sprout and produce a dense growth of foliage. These sprouts appear earlier in the season than any other host plants of the psyllid and the flea beetle.

The quantity of tubers discarded varies from year to year, depending on the quality of the crop and the market demand for potatoes. The quantity of potatoes that sprout in cull piles depends on spring weather conditions. If cold weather prevails, the growth of the sprouts and the resulting potato foliage will be retarded. If freezing weather occurs after the sprouts have started to grow, they will be frozen, but new sprouts will develop later.

Sprouts in cull piles make their most rapid growth during May and June. In July the tubers decompose into a soft mush, which no longer sustains the growth of the sprouts. This, together with the hot weather, causes the sprouts to die rapidly. In most seasons these sprouts will be dead by the third or fourth week in July. The infesting insects are then forced to move to any cultivated or wild host plants in the vicinity. When summer temperatures are below normal, or when the cull piles are protected from the action of the sun by trees or buildings, some of the sprouts on the cull piles may survive until the middle of August.

Insect Populations on Cull Piles. — Surveys of psyllids on potato sprouts in cull piles were made at weekly intervals during the years 1941-1950 in the North Platte Valley, in eastern Wyoming and western Nebraska. Similar surveys of tuber flea beetles on these sprouts were made from 1945 to 1950, inclusive, in this area. Counts were made by sweeping a 15-inch insect net across the tops of the growing sprouts and recording the average number of insects per 100-sweeps from 10 cull piles. Sampling for the two species was done simultaneously. Tables 1 and 2 show the average numbers of psyllids and tuber flea beetles per 100 sweeps at weekly intervals during the growing season of each year the surveys were conducted.

Potato psyllid populations on potato sprouts in cull piles vary considerably from year to year (Table 1). Their numbers depend on the size of the spring influx of that insect from sources outside the potato-growing area. The sprouts in cull piles, which grow earlier than cultivated crops, provide a place for incoming psyllids to collect and breed until crops are growing and are large enough to afford sufficient shade to protect the psyllids from hot weather. In most years a large influx of the potato psyllid occurs late in June or early in July, and these are forced to move soon after this time, when the sprouts in cull piles die. Below-normal summer weather, such as occurred in 1950, permit sprouts in cull piles to survive longer, and breeding of psyllids on the cull piles will continue into August (Table 1).

TABLE 1.— *Psyllid populations on potato sprouts growing in cull piles in the North Platte Valley, 1941-1950*

Date	Average Number of Psyllids per 100 Sweeps									
	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950
Apr. 29									0	
May 6		3.7	0.6						....	0
13	0	4.0	....	45.3	0				59.3	0
20	....	5.3	.1	18.5	4.4		0	1.3	30.0	0
27	16.9	15.1	.6	45.2	2.5	0.8	0.1	1.0	50.0	....
June 3	....	16.3	....	35.2	....	.9	.3	.5	36.0	0
10	15.0	19.6	1.1	24.9	1.8	2.3	1.0	2.2	35.9	0
17	27.3	22.0	.6	14.4	1.4	.8	1.0	2.1	67.3	0.4
24	95.3	86.2	.2	41.2	1.2	.5	2.1	6.0	1,376.6	.6
July 1	107.4	204.3	1.0	191.9	9.3	0	4.6	9.3	1,016.3	2.2
8	83.1	76.6	....	121.0	16.4	1.3	5.5	8.6	27.3	3.2
15	20.5	15.0	....	32.5	7.7	0	5.7	6.8	17.7	1.2
22	....	15.0	....	24.8	3.0	....	4.5	....	6.0	4.8
29	....	....	....	21.3	....	....	....	....	....	4.9
Aug. 5	....	....	....	9.0	....	....	....	....	....	4.1
12	....	....	....	....	....	....	....	....	....	12.5
19	....	....	....	....	....	....	....	....	....	5.0
Average	45.7	40.3	0.6	48.1	4.8	0.8	2.5	4.2	226.9	2.6

As the tuber flea beetles emerge from hibernation during May and June they collect on potatoes in cull piles. Therefore large numbers are available to move to cultivated crops when the potato sprouts in the cull piles die in July and August (Table 2). During the years of 1945-1948 the flea beetle populations were comparatively low on cull piles and flea beetle injury to crops was at a low level. In 1949 and 1950 the populations on cull piles were much higher, and injury to potato fields caused by this insect was considerably greater.

Prevention or Control of Potato Sprouts in Cull Piles. — Experiments were conducted from 1946 to 1949, inclusive, to determine the most efficient methods for preventing or controlling the growth of potato sprouts in cull piles. Tests were made on cull piles at commercial warehouses or on public dump grounds, each test being replicated three times. The treatments were applied each year during the latter part of May, and

TABLE 2.—*Tuber flea beetle populations on potato sprouts growing in cull piles in the North Platte Valley, 1945-1950*

Date	Average Number of Flea Beetles per 100 Sweeps					
	1945	1946	1947	1948	1949	1950
May 13	....	....	0	....	0.7	0
20	....	....	0.8	0.7	0	0
27	0	0	.2	0	0.7	....
June 3	....	4.4	2.9	0	6.5	1.3
10	28.2	20.9	5.9	9.5	51.7	4.1
17	21.7	18.4	14.8	7.8	63.9	.9
24	53.6	31.0	19.6	8.1	76.9	16.3
July 1	40.9	15.6	15.2	16.6	86.7	45.7
8	29.3	90.0	10.4	12.0	100.4	84.6
15	17.5	2.0	6.0	17.3	175.0	27.9
22	20.0	....	7.5	....	109.0	47.9
29	49.0	....	....	....	....	101.0
Aug. 5	10.0	....	....	....	....	98.7
12	6.0	....	....	....	....	150.3
19	4.0	....	....	....	....	53.3
Average	23.4	22.8	7.6	8.0	61.0	45.2

estimates of sprout growth were made in the second week in June and again in the first week in July. The plots contained 100 square feet of surface and approximately 2 feet in depth of tubers. The methods tested and the results obtained from each are as follows:

1. *Herbicides.*

Several herbicides were tested, including 2,4-D (butyl 2,4-dichlorophenoxyacetate), dinitro-o-sec-butylphenol, isopropyl 2,4,5-trichlorophenoxyacetate, ammonium sulfamate, sodium arsenite, a 2.5 per cent solution of sulfuric acid, and a saturated solution of ordinary table salt. None of these materials was completely effective in preventing the growth of sprouts in cull piles, being generally too slow in action.

2. *Sprout Inhibitors.*

The sprout inhibitors tested were sodium chlorate and methyl 1-napthaleneacetate. Sodium chlorate killed 80 to 100 per cent of the sprouts and the methyl 1-napthaleneacetate, when applied before the tubers had started to sprout, prevented the appearance of any sprouts.

3. *Burning.*

The methods of burning tested were with gasoline, fuel oil, straw, and a weed burner. These methods killed most of the growing sprouts, but failed to prevent the growth of new sprouts, necessitating repeated treatments to keep down the growth.

4. *Burial.*

Cull tubers were buried to depths of 12, 18, and 24 inches in loose, moist soil. Many sprouts emerged from tubers buried at a depth of 12 inches, and a few emerged at a depth of 18 inches, but none emerged from a 24-inch depth.

5. *Treatment with Oils.*

Waste crank-case oil, when applied to the tubers and growing sprouts, killed approximately 85 per cent of the sprouts. It is difficult to obtain sufficient quantities of this oil to treat large areas of cull piles.

6. *Mechanical Methods.*

The sprouts were killed by cutting them mechanically with a hoe or shovel, but new sprouts reappeared within approximately two weeks and repeated cuttings were necessary to keep down sprout growth. All the tubers that were spread out in a single layer on the soil surface and exposed to the elements were killed and no sprouts appeared. In one season, however, when high rainfall and much cloudy weather occurred, a few short sprouts appeared, but they were too few and too small to be a factor in insect breeding.

Discussion of Results. — It must be recognized that any means of eliminating cull-potato piles as breeding sources for injurious potato insects must be cheap, as well as easy to apply. The easiest and most effective method tried for disposing of cull potatoes was to spread out the tubers in a single layer on the soil surface so that they were killed by exposure to the elements before they sprouted. That method cost nothing except a small amount for labor in spreading the tubers while they were being dumped. Tubers dried in this manner are usable as cattle feed.

Herbicides applied to the growing sprouts are too slow in action to be effective. Sodium chlorate, although effective in preventing the growth of sprouts on potatoes, is expensive, as compared with other methods. This material costs approximately 18 cents per square yard, and requires as much labor but is not so effective as spreading the tubers. The use of methyl 1-napthaleneacetate, although effective in preventing the growth of sprouts, is also too expensive, as compared with the simple method of spreading the tubers to a single layer. Sulfuric acid is difficult to handle and objectionable for that reason. The burning of the plants with

gasoline is not only ineffective but hazardous, and other materials for burning are expensive and ineffective.

The labor involved in burying cull tubers to a depth of at least 24 inches to prevent their growth is too expensive. Cutting the sprouts with a hoe or shovel needs to be repeated several times during the growing period to prevent their development.

Cull potatoes that are dumped at public dump grounds, if not treated when dumped, are abandoned. They could be more easily scattered in a single layer on the soil surface when dumped than be treated with chemicals or be destroyed by other means that would require repeated treatments.

Literature Cited

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Dr. William Stuart

1865 - 1951

Dr. William Stuart, who for many years was in charge of the section of potato investigations in the United States Department of Agriculture, died at his home in Takoma Park, Washington, D. C., November 7, 1951, after a long period of illness.

Dr. Stuart was born at St. Remi, Quebec, Canada, in 1865. He received his bachelor of science degree from the University of Vermont in 1894 and the degree of master of science from Purdue University in 1896. He became a naturalized citizen of the United States in 1895. In 1926 the University of Vermont conferred upon him the degree of doctor of science as a reward for his outstanding achievements in the field of horticulture. At Purdue Agricultural Experiment Station he was assistant botanist from 1894 to 1901 and associate horticulturist at the same institution from 1901 to 1902. In 1902 he was appointed horticulturist at the University of Vermont Agricultural Experiment Station where he remained until 1909. From 1909 to 1912 he occupied the position of expert in the Bureau of Plant Industry, United States Department of Agriculture, after which he was promoted to horticulturist and continued in that capacity until he retired in 1935.

Dr. Stuart conducted experiments on a number of crops, but he is best known and will long be remembered for his work in potato investigations. He was without question better informed on all phases of the potato industry than any other man in the United States. He was one of the first

members of The Potato Association of America, which he served in many capacities and of which he was made an honorary life member on (the 27th of December, 1947). He took a large part in the development of what is now *The American Potato Journal.* He was the author of many scientific articles, the titles of which show his wide range of investigations. A partial list would include "Group Classification and Varietal Descriptions of Some American Potatoes," "The Tuber-Unit Method of Seed-Potato Improvement," "Production of Late or Main-Crop Potatoes," "Potato Storage and Storage Houses," "Potato Breeding and Selection," and many others. His book entitled *The Potato, Its Culture, Uses, History, and Classification,* although out of date in certain phases of the subject, is still useful to the student interested in the crop.

After his retirement Dr. Stuart made an attempt to revise his book but was prevented, by illness, from completing this task.

In his active days Dr. Stuart was a member of several scientific societies. He was not only a Mason but also a devoted member of the Presbyterian church, both of which institutions he served zealously and untiringly.

As a man, Dr. Stuart was characterized by an almost unlimited amount of energy and ability and looked for the same characters in others. His honesty, sincerity, and integrity could never be questioned. All who knew him held him in the highest esteem.

F. J. Stevenson

Dr. Forest Milo Blodgett

1885 - 1951

The sudden death of Forest Milo Blodgett following a cerebral hemmorrhage brought to an untimely close a long career of service to Cornell University and to agriculture. Surviving are his wife, Elsa James Blodgett, three children, and three grandchildren.

Professor Blodgett was born and reared on a farm near Brocton, New York, the son of Silas and Clara Jane Blodgett. After reeciving his preparatory education at Stockton High School and Fredonia Noraml, he came to Cornell and graduated in 1910 with a degree of Bachelor of Science in Agriculture. As an undergraduate, he studied under the late Professor H. H. Whetzel who induced him to undertake graduate work in the field of plant pathology. He spent the next four years in graduate study as a Hermann Frasch research fellow and received his doctorate in 1914.

During the year 1914-1915, Professor Blodgett was Associate Botanist at the New York (Geneva) Agricultural Experiment Station but he

returned to Cornell in 1915 to become an Assistant Professor in the Department of Plant Pathology. Subsequently, he was raised to the rank of Professor. He spent his sabbatic leave for the second term of the year 1923-1924 at the University of Wisconsin.

Professor Blodgett was a member of Sigma Xi, American Association for the Advancement of Science, American Phytopathological Society, and the Potato Association of America, serving the latter association as vice president in 1940 and president in 1941.

In the early years of his professional life, Professor Blodgett devoted his time to research on the control of hop mildew and apple diseases. He is better known for his extensive work and writings concerning virus diseases of the potato, the use of sprays and dusts for potato pest control, and the development of potato varieties resistant to scab and virus infection. He originated the tuber-index method of testing tubers for the presence of virus diseases. Blodgett was a student and ardent advocate of modern biometrics as a means of increasing the worth of field and laboratory experimentation. His strict obedience to biometrical practice, always a pattern for his research, earned for him a reputation for sound conservative judgment. Colleagues and graduate students frequently sought his advice when planning their experiments and in the statistical analysis of their data.

Quiet and unassuming, Professor Blodgett had no propensity for classroom or extension teaching. He preferred the field and the out-of-doors not only as a stage for his research but for the pursuit as well of his favorite hobbies, skiing, hunting, and especially fishing. He leaves behind a rich heritage in his many students, well trained under his guidance in the field of plant pathology.

W. A. Rawlins
W. H. Burkholder
M. F. Barrus

MINUTES OF EXECUTIVE COMMITTEE MEETING, DECEMBER 11, 1951

Place: Netherlands-Plaza Hotel, Cincinnati, Ohio.
Presiding Officer: Reiner Bonde, *President.*
Members Present: Reiner Bonde, R. D. Pelkey, G. H. Rieman, J. C. Campbell, Arthur Hawkins and Ora Smith.
Members Absent: A. G. Tolaas, H. A. Reiley and Wm. H. Martin.

Secretary Smith was requested to call Dr. Martin by phone with a special invitation to attend a proposed dinner in his honor the night of Dec. 12. Dr. Martin was unable to attend and the dinner was not held.

The Committee agreed to hold the Association's next Annual Meeting at Ithaca in conjunction with the American Institute of Biological Sciences, September 8-10, 1952.

Editorial policies of the Journal and financial difficulties of the Association were discussed at some length.

J. C. Campbell, Wm. H. Martin, and Arthur Hawkins were selected to find out what the American Phytopathological Society and other organizations plan to do with their similar problems and from that information they are to arrive at a solution for the Association. Increasing the price of reprints to authors, payment of cuts, large tables, *etc.* by authors were cited as possibilities.

The following committees were appointed:

Resolutions—Scannell, McLean and Rieman.
Auditing—Evans, Felton and Kopkins.
Honorary Life Membership—Hawkins, Pelkey and Evans.
Nominating—Darling, Scannell and Pelkey.

Meeting adjourned.

Ora Smith, *Secretary.*

MINUTES OF ANNUAL MEETING OF THE POTATO ASSOCIATION OF AMERICA

NETHERLANDS-PLAZA HOTEL, CINCINNATI, OHIO

DECEMBER 12, 1951

Meeting was called to order by *President* Reiner Bonde.

A short Presidential address was given by Dr. Bonde.

Ora Smith presented the Secretary's report which was accepted.

J. C. Campbell presented the Treasurer's report, a copy of which is attached. Report was accepted.

In the absence of Dr. Martin, J. C. Campbell presented the Editor's report. Report was accepted.

Henry Darling gave the report of the Certification Committee, a copy of which is attached. Report was accepted.

G. H. Rieman presented the report of the Potato Introduction Committee. Report was accepted. Copy is attached.

J. C. Campbell presented the report of the Editorial Committee.

The Executive Committee was empowered to study the reprint situation of other scientific societies and to act regarding the increase in price of reprints to authors.

Arthur Hawkins presented Membership Committee report which was accepted. It was suggested that a chairman for each state be appointed and that each member make it a point to obtain at least one additional member. It was suggested that there be registration with name cards at each annual meeting.

Resolutions Committee report was deferred until later. Report was not given at the Meetings.

Auditing Committee report by Evans found the books in good order. Report was accepted.

A rising vote of thanks was given *Associate Editor* Campbell for his work during the past year.

Nominees for Honorary Life Membership were Dr. Wm. H. Martin, Dr. M. F. Barrus and Mr. John Tucker. Dr. Martin and Mr. Tucker were elected by ballot. They were both then declared unanimously elected as Honorary Life Members.

G. H. Rieman made the announcement of the Lelah Starks Memorial Fund given to the Association in memory of Miss Lelah Starks, Starks, Wisconsin. The fund was gratefully accepted, the check being presented by Melvin Rominsky, Manager of Starks Farms, to Association Treasurer J. C. Campbell.

It was voted that publicity be given to this event and that an article be prepared for that purpose.

It was voted that next year's meetings be held at Ithaca, New York, September 8-10, 1952 in conjunction with the American Institute of Biological Sciences.

The following officers were elected for the year 1952:

President—G. H. Rieman.

Vice President—J. H. Muncie.

Director for 3 years—N. M. Parks.

Meeting adjourned.

Ora Smith, *Secretary*.

Executive Committee reconvened, December 13, 1951.

Members Present: Bonde, Hawkins, Rieman, Campbell, Parks, Pelkey and Smith.

J. C. Campbell was reelected *Treasurer* for a 2-year term.

Ora Smith was appointed chairman of local arrangements committee for the 1952 annual meeting with power to select other members of the Committee.

The Honorary Life Membership Committee appointed for next year follows: A. Hawkins, *Chairman,* J. C. Campbell and N. M. Parks. They are to poll the states for nominees during the year. These nominees will be voted on by mail by the Executive Committee, choosing not more than two members. Those elected to the Honorary Life Membership will be notified in advance of the Annual Meeting and they will be invited to attend the meetings and a banquet in their honor. It was decided that all living Honorary Members be sent a special invitation to attend the Annual Meetings.

J. C. Campbell was authorized to purchase a Christmas gift for his Secretary from Association funds.

Authorized payment of $400 to the Editor for 1952.

Authorized payment of $600 to the Treasurer for 1952.

J. C. Campbell and Dr. E. S. Clark were elected Associate Editors of the Journal.

It was suggested that each member of the Association make a special effort to increase the membership.

Meeting adjourned.

Ora Smith, *Secretary.*

TREASURER'S REPORT
THE POTATO ASSOCIATION OF AMERICA
Statement for the Year Ending November 30, 1951

Receipts			
Balance on Hand November 30, 1950	$1,081.67		
Annual Dues	3,989.82		
Sale of Advertising	2,515.54		
Sale of Reprints	793.75		
Sale of Index	236.70		
Miscellaneous, Back Numbers, *etc.*	295.37		
Total Receipts		$8,912.85	
Disbursements			
Printing of Journal (12 issues)	$6,508.10		
Printing of Reprints	754.40		
Mailing and Supplies	674.41		
Paid on Account for Index	200.00		
Secretarial Work	20.00		
Editorial Work	100.00		
Treasurer's Work	250.00		
Miscellaneous	232.93		
Total Disbursements		$8,739.84	
Balance on Hand November 30, 1951		$ 173.01	
Accounts Receivable			
Advertising — October and November (Approx.)	$ 282.00		
Reprints — Billed but not paid	191.75		
North Dakota Group	239.00		
Total Accounts Receivable		$ 712.75	
Balance on Hand plus Accounts Receivable			$ 885.76
Accounts Payable			
Printing October and November Journal	$ 848.32		
Printing Reprints	101.13		
Balance due on Index	359.50		
Balance due on Editorial work	400.00		
Balance due on Treasurer's work	450.00		
Total Accounts Payable			$2,158.95
Net Deficit			$1,273.19

John C. Campbell, *Treasurer*

ERRATUM

In the December 1951 issue of the "American Potato Journal" the article by Norman A. Vanasse, *et al*, entitled "Specific Gravity—Dry Matter Relationship in Potatoes" the ratio in Equation 7 given on page 790 should read as follows:

$$F = \frac{(T_{aa} + 2\bar{x}T_{ab} + \bar{x}^2 T_{bb}) \ / \ (\text{d. f. for effect})}{(E_{aa} + 2\bar{x}E_{ab} + \bar{x}^2 E_{bb}) \ / \ (\text{d. f. for error})} \quad \text{(Eq. 7)}$$